Art. XIV.—*Notes on some new or little-known Land Planarians from Tasmania and South Australia.*

(With Plate X.)

By Arthur Dendy, D.Sc.

[Read 16th November, 1893.]

I.—Tasmanian Land Planarians.

Geoplana tasmaniana, Darwin, sp.

Planaria tasmaniana, Darwin, Annals and Magazine of Natural History, vol. xiv. (1844), p. 246.

I have recived a large number of specimens from various parts of Tasmania which I believe to be referable to Darwin's species. The following description is taken from a living specimen collected by Mr. L. J. Balfour on Mount Wellington, in March, 1892 :— Body in life a good deal flattened, especially on the ventral surface, but with no well-marked lateral surfaces, the sides being rounded ; tapering very gradually in front, somewhat less so behind. When crawling, about 43 mm. long and 2·5 mm. broad. Ground colour of dorsal surface pale brownish-yellow, with five stripes of umber-brown. The median stripe narrow, dark and well-defined. The inner paired stripe broad and dark, but rather ill-defined, separated by an interval of ground colour about as broad as itself from the median stripe. The outer paired stripe at the extreme margin of the dorsal surface, narrow, rather faint and ill-defined, separated from the inner paired stripe by a band of ground colour about equal to the latter in width. Ventral surface white, with no markings. Anterior tip dark-brown. Eyes arranged as usual and continued all round the horse-shoe-shaped anterior extremity ; also continued down the sides of the body, sparsely, to the posterior end. After preservation in spirit the dorsal surface became more flattened, and its margins turned in to form more or less distinct but narrow lateral surfaces, carrying the ill-defined outer paired stripes. The peripharyngeal aperture (in spirit) is somewhat behind the middle and the genital aperture nearer to it than to the posterior end.

The copulatory organ may (in spirit) be protruded from the genital aperture in the form of a bladder-like vesicle, covered with numerous very minute, granule-like papillæ.

A good deal of variation occurs in the intensity of the colouration, and the consequent distinctness or otherwise of the stripes. The median stripe appears always to be the darkest and best defined.

There is a dwarf variety from the north coast of Tasmania, of which I received about twenty specimens collected by Mr. G. W. Officer, in February, 1892, and which differs from the types only in its very much smaller size.

At first sight this species looks a little like the common Australian *G. quinquelineata*, but it differs markedly in the shape of the body in spirit, the ill-defined character of the paired stripes, and the great breadth of the inner ones.

Localities. — Parattah (Professor Spencer; very common); Mount Wellington (L. J. Balfour, Esq.); near Newtown Falls (A. Morton, Esq.); North Coast (G. W. Officer, Esq.; dwarf variety only).

Geoplana diemenensis, n. sp.

This is a large and remarkably handsome species. The following description is taken from two specimens received alive from Mr. L. J. Balfour, who collected them on Mount Wellington in March, 1892 :—

Body at rest quite flat on the dorsal surface; broad; with narrow, inwardly sloping lateral surfaces. When crawling almost the same shape in section but not quite so much flattened; tapering very gradually in front and behind; unusually sharp-pointed behind. Length when crawling about 70 mm.; breath about 6 mm. Eyes as usual in *Geoplana*, continued all round the horse-shoe-shaped anterior margin. Ground colour of the dorsal surface sepia-brown, with indications of three darker longitudinal stripes, all ill-defined. (In specimens subsequently received in spirit from Mr. Morton these stripes are better marked; there is one narrow median stripe and a pair of much broader ones close to the margins of the dorsal surface). The dorsal surface is sprinkled all over, stripes and all, with small whitish specks; while under a low power of the microscope much smaller greenish specks,

probably groups of rod-cells, are also seen to be present. Anterior extremity dark sepia. Lateral surfaces mottled in about equal proportions of white and sepia. Ventral surface entirely white.

In spirit the peripharyngeal aperture is situated a little in front of the middle of the body and the genital aperture a little nearer to it than to the posterior end. The copulatory organs are extraordinarily large and complicated, and may (in spirit) be protruded from the genital aperture in the form of a pair of fleshy, somewhat comb-like processes, each bearing numerous conspicuous conical papillæ.

A slight variety of the species, obtained in quantity by Professor Spencer at Parattah, differs somewhat in markings from the typical form. An additional dark, ill-defined, paired stripe is present on each side of the median dorsal stripe, half way between it and the marginal stripe; and the speckled character of the dorsal surface is much less pronounced. Specimens of this variety (which I have seen only in spirit) approach *G. tasmaniana* in general appearance, but differ in the greater breadth of the body and, apparently, in the structure of the copulatory organs, which resembles that described in the type.

Professor Spencer also informs me that he found the species abundantly near Emu Bay, in January, 1892; that it sometimes attained a larger size than those described above, and that it varied considerably in colour. Unfortunately, the specimens collected by him in this locality all died.

It appears not unlikely that this species, in spite of its very much larger size, may be nearly related to our Victorian *G. quadrangulata*. So I judge from the characteristic shape of the body and the fundamental pattern. The point cannot, however, be determined without anatomical investigation, especially of the copulatory organs.

Localities.—Mount Wellington (L. J. Balfour, Esq.); near Newtown Falls (A. Morton, Esq.); North Coast (G. W. Officer, Esq.); Emu Bay (recorded by Professor Spencer); Parattah (Professor Spencer).

Geoplana lucasi, Dendy.

Geoplana lucasi, Dendy, Trans. Royal Soc. Vic., 1890, p. 74; 1891, p. 40, pl. iv., fig. 4.

With this rare Victorian species I identify, provisionally at any rate, three specimens received in spirit from Mr. Alexander Morton and Professor Spencer. They agree with the Victorian form in the characteristic broad, flattened body, much broader behind than in front; in the arrangement of the dark streaky markings on the dorsal surface; in the absence of markings on the ventral surface, and in the position of the external apertures (the peripharyngeal somewhat behind the middle of the body and the genital about half-way between it and the posterior end). The ground colour is yellow and the streaks or splotches dark-brown or purplish in spirit. In only one specimen, the smallest of the three, is the dark median dorsal line present, and even here not very strongly developed. The largest of the three specimens (in spirit) measures 27 mm. in length by 6·5 mm. in greatest breadth.

Localities.—Tasmania (A. Morton, Esq.); Lake St. Clair (Professor Spencer).

Geoplana mortoni, n. sp.

The following description is taken from five spirit specimens, which are so well preserved and well characterised that I have no hesitation in naming them, although I have not myself seen the animal alive. Four at any rate of the specimens reached me very soon after capture and have evidently undergone but little change in colour.*

Length (in spirit) about 40 mm., greatest breadth 5 mm. Broader, and much less gradually tapering, behind than in front. Dorsal surface strongly convex; ventral surface concave, with prominent, narrow margins. Dorsal surface yellow, closely mottled all over with small, irregular specks of brown. (The mottling, or marbling, is a good deal coarser in some specimens than in others). Ventral surface similar but paler, with the brown colour less developed and in smaller specks. A very narrow band of yellow, without any brown specks, occupies the prominent margins. The peripharyngeal aperture is situated in about the middle of the body, and the genital aperture usually

* Professor Spencer tells me that in life the colour is warmish yellow with warm umber splotches.

somewhat nearer to it than to the posterior end. The eyes, though not very numerous, are arranged as usual in *Geoplana*.

In the characteristic shape of the body this species closely resembles the Australian *G. fletcheri*, some of the varieties of which are also strongly speckled on the dorsal surface. It differs from *G. fletcheri* in the speckling of the ventral surface, the absence of continuous dark stripes, and the more anterior position of the apertures.

I have much pleasure in dedicating the species to Mr. Alexander Morton, of the Hobart Museum, from whom I first received it.

Localities.—Tasmania (Alexander Morton, Esq.); Parattah (Professor Spencer).

Geoplana munda, Fletcher and Hamilton.

Geoplana munda, Fletcher and Hamilton, Proc. Linn. Soc. N.S.W., ser. ii., vol. 2, p. 369, pl. v., fig. 8.

Geoplana munda, Dendy, Trans. Royal Soc. Vic., 1890, p. 73; 1891, p. 36.

Geoplana munda, Spencer, Proc. Royal Soc. Vic., 1890, p. 89, pl. xii., fig. 10.

In February, 1893, Professor Spencer collected a large number of this common Australian species at Parattah, thus extending its known range to Tasmania for the first time. The specimens, which he kindly handed to me in spirit, agree exactly with those commonly met with in Victoria.

Locality.—Parattah (Professor Spencer).

Geoplana adæ, Dendy, var. *fusca*, nov.

The following description is taken from a coloured sketch of the living animal (with measurements) drawn by Professor Spencer, and from three spirit specimens collected by him at the south end of Lake St. Clair, in January, 1893:—Body (when crawling) tapering gradually in front and behind; length 69 mm., greatest breadth 3 mm. The dorsal surface has a ground colour of purplish-grey, darkening in the middle line and at the margins, so as to form a narrow median, and a pair of much broader

marginal stripes ; none of the stripes well defined, however. The ventral surface is cream-coloured, with no markings, and is continued up round the sides of the body to form a border on either side of the dorsal surface, very sharply marked off from the dark-coloured portion. Hence, when the animal is viewed from the upper surface we see a broad median band of a dark colour bordered on either side by a narrow margin of pale cream colour, while in the dark band itself we can recognise three longitudinal stripes of darker colour than the rest.

In spirit the animal measures about 18 mm. in length, by 5 mm. in greatest breadth. The body is ovoid in section, somewhat flattened, especially on the ventral surface, but thick and with broadly rounded margins. Exactly the same colouration is visible as in the living specimen, except that the dorsal surface appears to be darker. The light margins are still conspicuous from the dorsal surface. The peripharyngeal aperture is slightly behind the middle and the genital aperture slightly nearer to it than to the posterior end. The eyes are very abundant, arranged as usual and continued down the light-coloured sides of the body to the posterior end.

This variety differs from the ordinary Victorian form chiefly in the absence of the narrow and sharply defined band of pale-yellow colour on each side of the dark median dorsal line. It appears to be a fairly well marked variety.

Locality.—Lake St. Clair (Professor Spencer).

Geoplana variegata, Fletcher and Hamilton.

Geoplana variegata, Fletcher and Hamilton, Proc. Linn. Soc., N.S.W., ser. ii., vol. 2, p. 364, pl. v., figs. 3, 3[1].

Geoplana variegata, Dendy, Proc. Royal Soc. Vic., 1891, p. 124, pl. ii., fig. 2.

A single specimen of this common New South Wales and Queensland species was obtained by Professor Spencer at Bedlam Heights, in January 1893, and, together with coloured drawings of the living animal, placed by him in my hands. I have no hesitation in making the identification, although, curiously enough, the species has not yet been found in the intervening colony of Victoria. The general shape of the body (in spirit),

the position of the external apertures, and, above all, the very characteristic arrangement of the coloured stripes, are identical. The general ground tint of the body in life was brown or bluish-brown, and the three narrow stripes, usually of "pale-yellow or greenish-yellow," lying in and near the mid-dorsal line, were decidedly green. When crawling, the specimen measured 44mm. long by 3 mm. broad.

Locality.—Bedlam Heights (Professor Spencer).

Geoplana typhlops, n. sp.

Geoplana alba, Dendy, Proc. A.A.A.S., Hobart, 1892, p. 370. (Not *G. alba* of previous papers).

In my previous notes on Tasmanian Land Planarians *(loc. cit.)* I identified two specimens of this species with the common Victorian *G. alba*, which it closely resembles in size, shape and colour. I noted, however, that I could find no eyes, and suggested that I might have overlooked them in the spirit-preserved specimens. I have, however, since then received several additional specimens, none of which show any eyes. One of these specimens I carefully examined in the living condition and could detect no eyes either under a hand-lens or when the head was compressed and examined under the microscope. The other specimens were examined in spirit. The Victorian specimens of *G. alba*, on the other hand, and also specimens of the same species which I have obtained from New Zealand, show the eyes distinctly under the dissecting microscope, even after being kept in spirits for many months. It therefore appears desirable to give a fresh specific name to the Tasmanian specimens, although I still believe them to be closely related to the common and widely distributed *G. alba*.

The following description of the species is based upon a very fine specimen which reached me alive and was collected by Mr. L. J. Balfour at Mount Wellington (Tasmania), in March, 1892 :—When alive of a pale brownish-yellow colour on the dorsal surface ; still paler on the ventral ; anterior tip white. No stripes at all. When crawling, about 115 mm. in length and 4 mm. broad. In shape and size exactly like a large specimen of *G. alba*, with the same characteristic crenate edges when at rest and

slightly ridged dorsal surface. In spirit a distinct, translucent, median ventral band appears, as already noted in the original specimen (this is much more obvious in some specimens than in others). The peripharyngeal aperture (in spirit) is decidedly behind the middle of the body, and the genital aperture much nearer to it than to the posterior end. The pharynx is funnel-shaped. The eyes appear to be be entirely absent.

Diesing's *Geobia subterranea*, from Brazil, is described by Moseley* as "Long and narrow, with rounded extremities, eyeless, and colourless. Lives underground in the holes of *Lumbricus corethrurus*, and preys upon that annelid." I have Mr. Alexander Morton's authority for stating that *Geoplana typhlops* is also sometimes found underground, but I believe that this is true of many Land Planarians. Whether the genus *Geobia* can be maintained appears to me very doubtful.

Localities.—Mount Wellington (Mrs. Dendy and L. J. Balfour, Esq.); Hobart (A. Morton, Esq.); Parattah (Professor Spencer, six specimens).

II.—South Australian Land Planarians.

Geoplana quinquelineata, Fletcher and Hamilton.

Geoplana quinquelineata, Fletcher and Hamilton, Proc. Linn. Soc. N.S.W., ser. ii., vol. 2, p. 366, pl. v., figs. 4, 5, 15, 16.

The known range of this common New South Wales and Victorian species is now for the first time extended to South Australia by the researches of Mr. Thos. Steel, from whom I received two small specimens in spirit in May, 1892.

Locality.—Extreme summit of Mount Lofty (Thos. Steel, Esq., 3rd May, 1892).

Geoplana fletcheri, and var. *adelaidensis*, Dendy.

(Plate X.).

Geoplana fletcheri, Dendy, Trans. Royal Soc., Vic., 1890, p. 78, pl. vii., figs. 8, 9; 1891, p. 38, pl. iv., fig. 6. Proc. A.A.A.S., Hobart, 1892, p. 372.

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* Quarterly Journal of Microscopical Science, vol. xvii. (N.S.), p. 289.

Geoplana fletcheri, var. *adelaidensis*, Dendy, Proc. A.A.A.S., Hobart, 1892, p. 373.

I am again indebted to Mr. Thos. Steel for no less than thirty-nine living specimens of this species, collected by him behind Mount Lofty on 3rd May, 1892. These specimens are extremely interesting, as exhibiting an unusual degree of variation in markings, as shown in the figures A to E (plate X.), and thereby connecting the typical *G. fletcheri* by almost insensible degrees with the, at first sight, very distinct variety which I have previously termed *adelaidensis*, and which I at first took to be a distinct species.

To judge from the large number of specimens met with in a very restricted area the species would appear to have its home in the Mount Lofty district, while in Victoria it is decidedly rare. It is interesting to note that no other species were found in association with it. The large number of specimens obtained by Mr. Steel is partly to be accounted for by the fact that the locality is a depôt for firewood brought from the immediately surrounding forest.

The general form of the specimens, including the strongly concave ventral surface, the markedly posterior position of the external apertures and the toughness of the skin, agree with the corresponding characters in the typical forms of *G. fletcheri* already described.

In all the specimens the ventral surface is of a pale yellow colour, without markings. The eyes are arranged in a not very densely crowded patch at each side of the head, in close-set single series round the horseshoe-shaped anterior extremity, and more or less sparingly all down the sides of the body to the hinder end.

Sometimes when at rest the body is supported on the edges of the ventral surface, leaving a hollow tunnel beneath the middle; this may be very conspicuous when the animal is resting on a sheet of glass and is viewed from beneath.

The variations in pattern, although very conspicuous, are all clearly due to the intensification or suppression of parts of what may be regarded as the typical pattern of the species; and, so far as I know, this statement holds good of all Land Planarians.

The ground colour of the dorsal surface varies from rich canary-yellow to very pale yellow. The markings (of various shades of

brown) on this ground colour vary from those of the variety *adelaidensis* (fig. A), through insensible gradations, to a form (D), which is almost entirely devoid of markings, but has just a faint rudiment of a median stripe, discontinuous, in the anterior half of the body, with still fainter rudiments of paired stripes at the extreme anterior end only, and faint traces of pale brownish specks at the posterior end visible under a pocket lens. This form (D) scarcely differs from the types of *G. fletcheri* first described from Victoria *(loc. cit.)*

The two other most conspicuous varieties are the ones labelled C and E in the drawings. In C there is a distinct but narrow, dark median stripe all down the body; the paired stripes, however, are present only at the extreme anterior tip, and there are only a few brown specks, very inconspicuous, in the ground colour at the posterior end.

In E, on the other hand, the median stripe is very thin and discontinuous, almost obsolete, while the paired stripes are strong and continuous all down the body, though evidently made up each of a number of specks run together, and stronger in front than behind. There are no distinct specks in the ground colour outside the stripes.

The variety represented in the drawing marked B is intermediate between A and C, all the markings of A (= var. *adelaidensis*) being present but, with the exception of the median stripe, fainter. In this variety *adelaidensis* (A and B) the dark-brown specks are sometimes very abundant at the outer margins of the body, indicating a tendency towards the formation of a second, outer paired stripe (compare *G. howitti**) especially marked at the anterior end.

Perhaps in all cases there are more or less distinct traces of five dark stripes, one median and four paired, running back from the dark pinkish-brown anterior tip. (Possibly *G. howitti* may ultimately have to be regarded merely as another variety of *G. fletcheri*, with its sub-variety *obsoleta*.)†

During the period for which I kept the above-described specimens of *G. fletcheri* and its varieties alive (3rd to 11th May),

* Trans. Royal Soc. Victoria, 1891, p. 39, pl. iv., fig. 5.

† Proc. Royal Soc. Victoria, 1891, p. 37.

seven cocoons were laid by them. These varied somewhat in form, being nearly round, oval, or distinctly egg-shaped. The largest measured 4 by 3 mm., but two were much smaller. After being laid for a few days the cocoons had a dull, almost black colour. When freshly laid and while still within the body they had a rich chestnut-brown colour. Only one was observed inside the body, causing a swelling just behind the genital aperture.

About a month after the cocoons were laid the young began to hatch out. On 6th June I found two recently hatched young in the vivarium. They were only about 8 mm. long when crawling. Shape and movements of the body as in the adult. Eyes abundant in single series on the sides of the head, round the horseshoe-shaped anterior margin, and continued more sparingly to the posterior end. The ground colour of both surfaces was bright yellow, with distinct brownish-pink anterior tip. In both specimens specks of brown pigment were scattered over the dorsal surface. In one they were clearly arranged as in fig. E of the adult, with the addition of scattered specks outside the outer band of specks. The other specimen only showed traces of a similar arrangement.

On 9th June three more young were observed, one of which showed three distinct longitudinal lines of specks as before, while the other two showed only a very few, faint, scattered specks.

I have no observations as to the number of young developed in each cocoon, probably two or three, as in other species (*e.g.*, I have found three young in a cocoon of *G. alba*). After the escape of the young the split shell still contains a quantity of milky fluid and curls up.

Locality.—A deep gully just behind Mount Lofty (T. Steel, Esq.)

In conclusion, I desire to express my thanks to Professor Spencer and Messrs. Alexander Morton, G. W. Officer, L. J. Balfour and Thos. Steel for the specimens described in this paper.

DESCRIPTION OF PLATE X.

Five specimens of *Geoplana fletcheri*, selected from a collection of thirty-nine specimens and drawn from life to illustrate the variation in colour-markings. All the specimens are viewed from the dorsal surface, and represented of twice the natural size. (Fig. A represents the variety *adelaidensis*, which has the most strongly developed markings).